

PRENTICE COMPUTER CENTRE

UNIVERSITY OF QUEENSLAND, ST. LUCIA, QUEENSLAND, AUSTRALIA. 4067.



NEWSLETTER

N-291

August 1984

CONTENTS

- 1.0 Newsletter Summary.
- 2.0 Charging for the IBM 3083E System.
- 3.0 Facilities available on the IBM 3083E System.
- 4.0 On-Line User Documentation available under IBM Conversational Monitor System.
- 5.0 IBM Network Connection.
- 6.0 A Stitch in Time ...
- 7.0 MAIL System Modifications.
- 8.0 Maximum Typesetting Width Reduced.
- 9.0 Typesetting on the VAX.
- 10.0 The Nine Lives of TCS.
- 11.0 Availability of HP-7585 Plotter for VAX Users.
- 12.0 KERMIT Developments.
- 13.0 Information Concerning Courses.

Authorized by the Director of the Computer Centre

Principal Service Centres

Extensions

Operations Manager	3471
Contract Programming & Feasibility Studies	3944
System Status Automatic Answering	3101
General Enquiries & Course Enrolments	3018
Training & Courses	3021

Consulting

PROBLEM AREA	MAIL BOX	NAME AND EXTENSION
IBM HELP Desk	CCHELP	Christine Gibson 3941

Operations and Programming

Accounts	ACCOUNTS	Carol Walker	2188
Cobol	COBOL	Porl Gordon	2953
Commands, system use and probs	COMMANDS	Ian Otto	4075
		Greg Lehmann	3020
Database	DATABASE	Brett Peterson	2836
		Marie Bultreys	2835
Fortran	FORTRAN	Noela Meier	3023
Graphics	GRAPHICS	Mark Williams	2921
Micros	MICROS	Peter Akers	2951
Network	NETWORK	Bryan Claire	4078
		Arthur Hartwig	4079
Operations	OPERATIONS	Senior Operator	3212
PDP-11 Software	PDP11	Danny Smith	2921
Program Library	LIBRARY	Lee MacDonald	3943
Statistics Packages	STATISTICS	Barry Costin	3022
Text processing, Typesetting	TEXT	Andrew Broughton	2837
		Porl Gordon	2953
Non-specific problems	OPERATIONS	Senior Operator	3212

Engineering and Maintenance

Development and communications	ENGIN	Graham Rees	3288
Mini/Micro support	ENGIN	Alan Langdon	4018
		Martin Nicholls	3942
Terminal, line & mini probs	MAINT	Maralyn Kenley	3938
Dial-up modem numbers		(300 bps)	3772977
		(1200 bps)	3772922

Griffith University:

Consulting	7682
Computer Services	7560
Computing Co-ordinator	7561

Terminals, CDN & Equipment Pricing

For prices on microcomputers, terminals, line charges, computer bits and pieces, type HELP PRICES on your terminal. This will provide appropriate menus.

1. Newsletter Summary

- This newsletter includes a copy of a memorandum on charging for and facilities available on the IBM 3083E computer.
- A detailed description is provided of the system available for file transfer between the IBM 3083E system and the rest of the network.
- On-line documentation (INFO) is now available to provide information on the use of the Conversational Monitor System (CMS) on the IBM 3083E system.
- Please check with the Computer Centre if you require files or programs transferred to another institution.
- The Electronic Mail system for the KL10 computer has had some additional features added.
- The maximum typesetting width is 69 picas and not 70 as advised previously. Typesetting directly from the VAX with VAX commands is now possible.
- A new version of software to drive Tektronix terminals (TCS) has been installed. Existing programs should not need alteration.
- Users of the VAX 11/780 can now access the HP 7585 plotter. This has 8 pens and draws on sheets up to A0 size.
- There is a new distribution system for KERMIT. This package from Columbia University Centre for Computing Activities enables file transfer between various types of microcomputers and mainframes.
- Details of the short courses conducted by the Centre are provided.

2. Charging for the IBM 3083E System

Introduction

At its meeting of 21 June 1984 the Academic Board, on the recommendation of the Computing Policy Committee, approved that as a trial in Second Semester 1984 a different basis of charging would be used for the IBM 3083E system. A fixed amount will be paid monthly for a "virtual machine kit". The size and the appropriate charge will be determined by the amount of virtual memory and the amount of online disk storage. *Usage other than normal charges for printing and tape mounts would not be charged.*

It should be appreciated that the proposal is to a large degree experimental and while the initial charges have been determined as well as we can on the current evidence of costs, usage, job mix and reasonableness, there will obviously be some adjustments as a result of the trial.

The period of non-charged access to the IBM system involved 142 users. Ninety (90) of these used 1 megabyte (Mb) kits the smallest size proposed, forty-six (46) 2Mb kits and six (6) larger size kits. A number of users of 2Mb kits could probably have operated satisfactorily with a smaller kit size.

Period of Lease

It is essential to keep accounting overheads as low as possible, both for Departments and the Centre. The minimum period of rental for a kit will be monthly (calendar month) the charge will be for the highest kit size used during the month. For undergraduate students, Departments can elect to use the special low overhead

student rate but charged on a full semester basis. Charging for Second Semester 1984 will commence with the month of August and users should submit authorisation forms (see later section) as soon as possible to enable user IDs to be established for use by 1 AUGUST.

Charges

Virtual Memory Charge – The minimum useful memory is one (1) Mb. We expect this to be the most usual memory kit size. Our preliminary costing suggests that the charge for 1Mb of memory should be \$35 per month. The charge curve then rises fairly steeply on the basis that higher amounts of memory will involve large CPU and I/O usage.

The following table provides representative charges but it is possible to obtain memory after the first 1Mb in 4Kb increments:

Memory Charges

Mb	\$ per month
1.0	35.00
1.5	127.08
2.0	240.00
3.0	509.17
4.0	820.00
5.0	1161.82
6.0	1528.33
7.0	1915.38
8.0	2320.00

Online Disk Storage – Disk Storage will be allocated in units of 600,000 bytes (600Kb) for usual virtual machines and 512Kb for shared SQL virtual machines. The cost is less than for the KL online storage and, in this case, the charge curve moves downward reflecting the lower overheads for larger levels of storage (e.g. less fragmentation of the real disk). Representative charges are provided in the table below:

Disk Storage Charges

Units	\$ per month
1	4.50
2	8.65
3	12.52
4	16.18
5	19.66
10	35.26
25	73.66
50	127.45
100	221.59
250	467.74
500	834.10
1000	1503.18

Storage can be provided in increments of one storage unit.

Student Charges

It is envisaged that, in the longer term, a student will have only one virtual machine on the IBM system irrespective of the number of subjects involving computer use for which they are enrolled. This obviously would reduce administrative

overheads for all concerned including the student and will reduce costs substantially. It is not possible to implement this during the trial system and student virtual machines will be charged at half the above rates on a semester basis (assumed to be 3 months for the purpose of calculation).

Sharing of Resources

The user ID is associated with a Kit so that in normal circumstances when operating under the Conversational Monitor System (CMS) only one user may be logged into a virtual machine. This should not be a difficulty in the majority of cases where individual users have their own small machine but there are problems where a department wishes to purchase a larger machine to be shared by a number of users. There are a number of options available. Those to be offered during the second semester are:

- (a) *Shared Disk Space.* A department may purchase additional storage to be associated with one of the department's virtual machines as a departmental disk library. System linkages will be established to this disk library to provide access to other departmental user IDs. If required, passwords can be associated with the link.
- (b) *Shared Batch Machine.* The department, faculty or group may lease a larger batch machine and work can be submitted to it by other smaller departmental virtual machines. The minimum size of a batch machine will be 3Mb of memory and 5 units (approximately 3Mb) of disk storage. Batch machines will be available only between 2000 hours and 0900 hours.
- (c) *A Single Shared Virtual Machine.* Where data security is not a problem and where it is feasible for arrangements such that only one user is logged into a virtual machine at the one time, some departments may wish to purchase a larger machine for shared use. Users can, of course, have their own named files but they would be accessible by all users who are provided with the ID and password.
- (d) *A Virtual Machine Shared by Users of Other Virtual Machines.* This is a combination of (a) and (c) with linkages to data areas protected by password. The data on each personal machine would only be available to the owner of that machine while the data on the large shared machine would be accessible to all those sharing it. It does involve switching from the personal virtual machine to the shared machine. Files would be available either from one's personal virtual machine or from the departmental disk library.

Some Examples

A typical student low overhead machine of 1Mb of virtual memory and 600Kb of online disk storage would cost \$59.25 per semester. A popular machine for academic staff will be a personal virtual machine with 1Mb and 1800Kb of disk storage. The cost of this would be \$47.52 per month. Given the power of the 3083E and the software facilities available, this would compare more than favourably with the cost and facilities of a personal computer.

Another strategy would be to associate a number of 1Mb virtual machines with a departmental batch machine with 3Mb of memory and 6Mb of disk storage to perform the large computing jobs of the department. The cost of the batch machine would be \$6533 per annum and provide a system with computing power in excess of 4 times a VAX 11/780. Of course, a department may not require a machine with so much power for the full year and costs would be reduced accordingly. Another alternative is for a faculty or a group or a less formal partnership of departments to lease a batch machine for shared use.

A department may wish to establish a number of 1Mb machines and establish a shared larger virtual machine. The monthly lease cost of a 1.5 machine with 3Mb of

disk space would be \$146.74 per month and a 2Mb machine with 3Mb of disk storage would be \$259.66 per month.

Facilities

A summary of facilities available on the IBM 3083E system is provided in section 3 of this newsletter. Some of the systems software and packages have been installed for evaluation and we would be grateful to receive user comments.

Having regard to the increasing cost of software, there will be a need to rationalise software costs across all of the Central Systems. For example, the Statistical Analysis System (SAS) rather than SPSS will be provided on the IBM system.

There is a vast range of packages available for the IBM system and, whilst there is a need to be selective, we would welcome your requests particularly for packages not currently available on other systems. UNIX* (Trade Mark of Bell Laboratories) will not be available on the IBM 3083E system until First Semester 1985.

Administration

A form giving the Centre authority to establish or alter virtual machine kits and to charge associated costs to a nominated QUBAC account will be available from the Centre's Accounts Section from MONDAY, 16 JULY (copies will also be sent to each department). Where many identical kits are to be set up (e.g. for a number of students), a list of users' names should be attached.

Accounts will normally be processed monthly with the first run at the end of August.

Summary

It should be emphasised that the Second Semester charging of the IBM system is experimental. It represents a departure from the traditional methods of charging and is consistent with a higher proportion of our charges being of fixed nature. The IBM system is also new to the Centre. We do not yet have the same detailed technical knowledge as we have of the DEC systems and we have not had the opportunity to alter the standard manufacturer supplied system to meet the specific needs of our environment.

The charging system proposed provides a great deal of flexibility for departments to configure virtual machines to minimise cost at a fixed monthly charge. This system of charging, therefore, favours those who make reasonable use of a computer. Casual users may find it more cost effective to remain on the KL10 or the VAX 11/780.

Allan Woodland (extension 2935) is responsible for co-ordinating the implementation of the IBM system and he would be pleased to discuss with you or your representatives possible strategies for your department. Please let me know if you wish to have further explanation of this proposal or if you envisage practical difficulties for your department for the Second Semester Trial.

Director
extension 2189

3. Facilities available on the IBM 3083E System

Introduction

This article summarises the main facilities available for the Prentice Computer Centre's recently-installed IBM 3083 system.

This system is now identified as 'VM' to the MICOM switch and 'UQVM' for

networking purposes.

A wide range of basic software is already installed, installation of other software is continuing, and additional programs are currently being evaluated.

Documentation for IBM products is generally available (or can be ordered) from the University Bookshop. IBM documentation is generally extensive, and compact 'reference cards' are available for many programs, including VM/CMS and the language processors.

Standard System Software

The System Control Program for the 3083 is IBM's VM/CMS timesharing system.

VM/CMS has a diverse range of integrated facilities for timesharing and an easy-to-understand English-like command language.

VM/CMS facilities include the following:

- A powerful editor (XEDIT).
- File and library management tools (FILELIST, COMPARE, TYPE, PRINT, COPYFILE, MOVEFILE).
- Program development tools.
- Electronic mail facilities (NOTE, RDRLIST, SENDFILE, PEEK, RECEIVE) with automatic logging and acknowledgement.
- Comprehensive on-line HELP facilities with information on all generally-used commands, including VM/CMS generally and the editor (XEDIT), as well as all system-generated error messages.

Additionally, VM/CMS can be easily extended and customised to further increase the user's productivity. Examples of this customisation are given below.

Installed IBM Programs

The following IBM software is now installed and available for regular use.

- Language processors (compilers, interpreters, and utilities)
 - FORTRAN – IBM VS/FORTRAN (FORTVS command) provides support for FORTRAN at both the FORTRAN-66 and FORTRAN-77 levels, with 4 different levels of optimisation available.
 - FORTRAN Interactive Debug (TESTFORT command) provides interactive debugging facilities for programs compiled by the VS/FORTRAN compiler.
 - The FORTRAN UTILITIES for VM/370 is a set of FORTRAN callable subroutines that provide an interface between FORTRAN programs and VM/CMS. This set of utilities includes routines that allow a FORTRAN program to:
 - Execute VM/CMS commands
 - Open and close files
 - Spool printer files
 - Clear the screen
 - Obtain system date and time
 - Convert an IBM EBCDIC file to/from ASCII
 - Read or write data arrays on random-access disk data sets with a fast data transfer and no pre-defined extents.

This package is installed for evaluation.

- The IBM OS/VS COBOL compiler (COBOL command) and libraries are installed.
- COBOL Interactive Debug (TESTCOB command) supports interactive debugging for programs compiled using the COBOL compiler.
- PASCAL – The IBM PASCAL/VS compiler (commands PASCALVS and PASCMOD) supports program development in the PASCAL language. In addition, PASCAL/VS includes interactive debugging commands.
- BASIC – the IBM BASIC compiler provides for interactive and batch modes of operation. Additionally, programs may be interpreted (as during the development cycle) or compiled for later execution (when stabilised). IBM BASIC is installed for evaluation.
- The IBM PL/I Optimising Compiler is also installed for evaluation.
- The Document Composition Facility (DCF, or SCRIPT) is a text formatting program (somewhat similar to RUNOFF).
- Computer-Aided Instruction is supported by the following programs:
 - Interactive Instruction Authoring System (IIAS) is used to generate courses.
 - Interactive Instruction Presentation System (IIPS) is used by 'students' to take prepared courses, whether obtained from IBM or generated locally using IIAS.
 - IPF (Interactive Productivity Facility) provides assistance for new or infrequent users, including a panel-oriented environment to guide such users through many common tasks. IPF includes the following on-line courses on VM/CMS:
 - 'How to use XEDIT'
 - 'How to use EXEC-2' (command) language programming
 - SQL/DS – IBM's relational database system, provides an interactive interface to the database system by the ISQL command (Interactive SQL) or program access from FORTRAN, COBOL, PL/I, or ASSEMBLER languages.

Customisation and Extensions to VM/CMS

The VM/CMS system has been extended and customised in many ways, particularly by providing additional commands, and occasionally by customising provided facilities.

Most of these facilities are summarised in the on-line information system available through the INFO command.

Amongst these extensions are:

- File versioning implemented for the editor (XEDIT), and supporting file management utilities to support file versioning.
- Improved screen layout for XEDIT, to make it easier to use by providing summary information at the bottom of the screen.
- Numerous tools and utilities to aid file transfer and conversion, especially to and from tape.
- Multitudinous additional VM/CMS commands and XEDIT macro programs to assist program development.

- Many CMS commands to assist in file and library management and control.
- A simple program development facility (DEV command) to aid the user wishing to develop, compile, and execute simple programs.
- Extensions to the electronic mail facilities.

User Assistance/Information Retrieval Facilities

The following facilities are available to assist users in finding information on the system, and to enable consultants to better assist users.

- **CVIEW** – The IBM Co-Operative Viewing Facility.
CVIEW enables a consultant to share (or 'shadow') a user's terminal session, thus enabling a consultant to actually see the user's problem as it occurs. This removes the need for a user to travel to the consultant's location when a problem arises, or to try to describe the problem over the phone to a remote consultant. CVIEW is currently under evaluation.
- **INFO** – This command enables a user to find information about facilities on the system in a structured way, without requiring the user to know about the system commands. The information is structured according to task rather than system commands, and includes information on custom-developed as well as system commands.
- **SEARCH** – This command enables a user to search the summary files used by the INFO command to enable a high level query for the user uncertain about the commands available. For example, the command 'SEARCH COMPARE' would display a summary list of commands which are used for comparison operations. The user could then use the INFO command for any or each of these to elicit further information.
- **NEWS** – This command will present the user with news on any specified topic, or permit the user to select from a list of available NEWS items. Normally, a user will only be shown new 'NEWS' items.
- **Storage And Information Retrieval System (STAIRS)** is an IBM program that facilitates the storage of large volumes of free-formatted text and efficient and rapid retrieval by interactive or batch means.
STAIRS/CMS documents may contain formatted (i.e., fixed-format) and/or non-formatted (i.e., free-format text) fields. STAIRS/CMS is installed for evaluation.
- **Information/System (OZ command).**
OZ provides access to a large on-line database which is regularly updated by IBM, and contains information on various aspects of the specifications, use, installation, and administration of IBM systems and software. OZ is installed for evaluation.

Included is such information as:

- IBM Support Centre answers to commonly-asked installation or usage queries.
- Installation and usage tips related to IBM products.
- Extracts from announcement or availability notices for IBM products.
- Information on available IBM publications for programs, to facilitate the selection of appropriate documentation for the user.
- Software Catalogue – comprehensive abstracts of many of IBM's soft-

ware products.

- Extensive on-line HELP and tutorial information.
- Educational information – a summary of available IBM courses.
- Additionally, user data can be placed into the Information/System database.

Utilities and Support Software

- File transfer facilities from UQVM to UQVAX.

Software is installed and under test now which permits transparent file transfers from UQVM to UQVAX.

This facility can be used from UQVM in the following ways:

- NOTE – electronic mail sent from the UQVM system to users at node UQVAX will automatically appear as MAIL files on the VAX, just as if they were sent from another VAX node.
- SENDFILE – files sent from UQVM to users at node UQVAX will be automatically converted to the corresponding form on UQVAX. In general, all files except files containing binary data should be converted correctly.

The recipient on UQVAX will be notified of the arrival of files from UQVM, and can use the IBMRCV command to have them automatically translated and re-formatted into VAX files.

- File transfer from UQVAX to UQVM.

The facilities available are:

- MAIL – to send MAIL from UQVAX to UQVM it is only necessary to specify the addressee as

GATEWAY::"userid@UQVM"

and files will appear automatically at the correct user on the UQVM system, just as if they were from another VM/CMS system. They can then be handled normally, using the RDRLIST (RL), PEEK, and RECEIVE commands.

This facility has now been in production for some time, and works reliably and well.

- IBMSND – this command enables the user to transfer files of any format (excluding binary files) from UQVAX to UQVM, just as SENDFILE enables transfer from UQVM to UQVAX.

- File printing at Griffith University.

It is now possible to route print files automatically from UQVM to the Griffith University printer via the UQVAX system. Further information on this facility will be made available via the NEWS facility.

- SUPERC – The IBM Source Audit/Compare Facility – is installed for evaluation. SUPERC is a sophisticated file compare utility.
- IBM Sorts Extended (SORT, SORTF, SORTV commands) are a package of advanced SORT functions providing sorting facilities and performance considerably better than those provided by the standard VM/CMS SORT verb. This package is installed for evaluation.
- SAS – The Statistical Analysis System – is now installed for evaluation.

SAS provides extensive facilities for the manipulation of numerical data, and its presentation in a variety of output formats, including several graphical formats.

- VM Passthrough (PVM – Passthrough Virtual Machine). PVM provides (PT and PASSTHRU commands) a virtual terminal facility in VM/CMS, which permits the user to have multiple concurrent terminal sessions active on one physical terminal. This is particularly useful for the user who requires access to multiple userids and wishes to avoid multiple logon/logoff sequences. PVM permits rapid switching between the several terminal sessions, as well as a 'screen snapshot' facility which permits a screen image to be automatically recorded in a disk file.
- SMART – The IBM VM Realtime Monitor – is used to monitor and analyse system performance, and as a problem determination aid in realtime for system performance problems. In addition to use by systems analysts, the SMART command can also be used by general users to display system performance information. SMART is installed for evaluation.

Future Activities

- PROFS – The IBM PROfessional Office System. PROFS provides an integrated office system designed to support a range of users from typists to executives, with particular emphasis on providing support to professionals at all levels.

PROFS is not yet installed on the system. Installation will begin soon, and it is expected that PROFS will be introduced gradually to departments to enable its effect to be carefully monitored during the implementation cycle.

PROFS includes the following facilities:

- Operates directly under the control of VM/CMS, enabling free access to the user's files from the office systems environment. Because of this, PROFS provides a rare integration of office functions with DP facilities, instead of the arbitrary separation imposed by other systems.
- Extensive electronic mail facilities exceeding those provided by VM/CMS itself.
- Spelling checker which may be used to check the spelling of documents, electronic mail, or even brief memos, with automatic correction requiring minimal user involvement.
- The spelling checker includes extensive dictionaries, including medical and legal.
- User dictionaries may be added, and may be extended dynamically as new words are found in documents.
- UK or US English may be spell checked.
- Calendaring facilities, which enable one user (typically a secretary, if authorised) to view and update a the calendar for one or more other users (typically managers or professionals).
- Calendar facilities may be used to arrange meetings, resolving conflicts between calendars of the various attendees.
- Electronic mail provides 'forwarding' to other users.
- 'Tickler file', or 'follow-up', is supported by the electronic mail facilities.
- The PROFS document database permits indexing and retrieval by vari-

ous search criteria, including date, subject, author, recipient, and other user-specified indexing information.

- Statistical and Graphics Packages

One statistical/graphics package is currently being evaluated (SAS, see above). The Centre is currently investigating other relevant packages in this area.

- General Network File Interchange Facilities

This area, still under investigation, includes such facilities as the ability to route files from UQVM to any network printer or other file destination, such as the typesetter or plotter.

Problems

The following problems are known to exist, and are currently being investigated:

- Hardcopy terminal support is limited at present, owing in part to the IBM emphasis on support for VDU's. This matter remains under investigation with IBM, and considerable improvements are expected.
- Line speeds are currently a cause for concern amongst users with dial-up or low-speed lines. As the Centre's line speeds are progressively upgraded improvements in this area will be forthcoming. It seems that a line speed of at least 1200 baud is desirable.
- There is limited support for ASCII graphics terminals on the IBM system. This topic is also under review with IBM and reasonable improvements can be expected.

*Director
extension 2189*

4. On-Line User Documentation available under IBM Conversational Monitor System

Perhaps you've held back from leaping in and learning about the new IBM 3083 system and the CMS commands because you logged on one day, tried to find out how to submit a batch job, or how to mount a tape, or how to compile a FORTRAN program and couldn't get any help. You typed in the HELP command and this didn't get you very far at all. In disgust you turned off your terminal, hung your CDN modem back up on its hook in the corner and wandered off to have a cuppa. No longer do you have to suffer – wait till you see the joys we have in store for you.

The reason you couldn't get help on things like batch, tape mounts, compilers, and all those other things you tried is because CMS provides help only for its own commands, and for CP, DEBUG, EXEC, EXEC2, REXX, XEDIT and SQL. Apart from SQL these make up an operating system package which IBM refers to as VM/SP. SQL is thrown in to the HELP system just to make life extra simple for you. However when it comes to those other software items which are not strictly part of VM/SP it is rather common for no help to be available within the standard help structure. So what do you do? You could try typing the name of the command you wish to use followed by a question mark. Doesn't that help? It sure does – it types out lots of information about how to use the command – that is provided you know what the command is you wish to invoke. If you don't you have a problem – or you HAD a problem, up until now that is.

When you are using a computer system you generally must know about what

you want to do, rather than how to do it. So why not have some sort of on-line information system which you can tell what you want to do and which suggests commands which could help you in your task. Sounds great doesn't it? It is great, it is now available for you to use, and it's called INFO. Why don't you warm up your modem, turn on your terminal, log in to the 3083 system and try it out. Just type INFO followed by the key labelled 'RETURN'. What do you see – a menu screen which lets you select an option which best suits the task you have in mind. Say you want to send some MAIL to someone on the VAX – you pick the option which sounds most appropriate (the one called MAIL in this case). When you type MAIL (followed by the return key) you will see another menu screen displayed. Once again you can select the option which is most appropriate for the task you have in mind. Fun isn't it – and a great help too. You'll have noticed by now that you can type PFK4 (that's generally the ESC key followed by the digit 4) to quit from INFO, or if you are several levels down in the heirarchy you can type PFK3 to return to the previous screen.

Once you get to know your way around the INFO system, or if you know more precisely the area you are interested in before you start, instead of just typing INFO you could type INFO MAIL to take you straight to the MAIL panel. Or you could type INFO TAPES to take you to the panel describing the commands which pertain to the use of magnetic tapes on the system. If you are not sure exactly which area you should be looking in for information you could try the SEARCH command. You use the SEARCH command to search through all the single line descriptions contained in the INFO panels. The search that is performed is just like the search that's done for you when you use a file editing program on a computer – it searches for the exact characters you type even if they are contained within another word. This means that the command 'search compil' will find such things as the word 'compile', 'COMPILER', 'compilation', but not 'compare'.

Many of the commands referenced by INFO are actually specially written user tools (which are kept on the TOOLS disk) that have been developed by an Advisory Systems Engineer working for IBM. They have been designed to do lots of those menial and boring things which up until now may have left you rather frustrated. They provide a wide range of very useful facilities and it is well worth looking through INFO to see what is available. All of these tools have a small INFO file provided which tells you how to use it. You can either peruse these INFO files by tracing through INFO, or if you know the command for which you want the help you can type SHOWINFO followed by the command name. So to get help on the tool called DEV (used to make things really simple when you are developing a new program) you would type SHOWINFO DEV.

While there is an excellent range of documentation available on-line on the VM system, there may always be the time when you prefer to reference an IBM manual. Do you want some help finding out which is the appropriate manual for you to get? Type in the command MANUALS. They're all there, listed in product order so that all the FORTRAN manuals are together in the list, and all the batch manuals are together. The list tells you which manuals are available for each product as well as the manual number (which you'll need when you order it from the University Bookshop). If a manual isn't in the list then as far as we know IBM doesn't make it. If you happen to need some more information on the manuals or the products, you can reference the OZ data-base (named after the Wizard thereof) which will generally tell you all you wanted to know but were afraid to ask. To enter OZ you just need to type OZ on your terminal, and once you're in type PFK 1 (that's the ESC key followed by the digit 1 on your terminal) for help on how to use the package. There's quite a lot of information stored by the wizard and some of it you may find rather confusing. Generally you should stick to the B, D, H, and T files. The others refer to things like problem fixes in IBM software, and I'm sure most of you aren't

interested in THAT.

If you want information about the various courses which are going to be held over the next few months (I mean only the Computer Centre ones put on by Barry and Leonie) then type in the command COURSES. This will show you which courses are coming up, what time they'll be on, where they're going to be held, what to bring for morning tea, and who to contact if you'd like to go along. The courses listed will generally be only those of interest to users of the IBM system, but could on occasion contain details of other courses as well.

There's one more facility you should know about. That's NEWS. NEWS will print out small bulletins on selected items. For example NEWS SYSTEM will print out details on what is happening (or about to happen) to the 3083 computer system. NEWS FORTRAN will print out any pertinent information about FORTRAN. And on it goes. As an added bonus the system news is displayed for you when you log in (but only the information you haven't seen before of course). When you type the NEWS command from your terminal you will generally be shown the entire news information file. If this is not what you desire, i.e. you only wish to see the information you haven't seen before, then use the NEW option. For example to see only the news about FORTRAN which you haven't seen before you should type "NEWS FORTRAN (NEW)". Try it out and see what you think.

The only way facilities like INFO and NEWS can be totally useful is, after you have really tried them out, if you found them difficult to use then let us know, or if things didn't seem to work also let us know. If you do have problems or if you have any thoughts about how you think the system could be made more friendly and simple to use why not send a NOTE to CCANDREW or to POOL.

Andrew Broughton
extension 2837

5. IBM Network Connection

A system is now available for transferring files between the IBM VM/CMS users and VAX/VMS users. Because of the way VAX/VMS supports network file access it is possible for a VAX/VMS user to send files from departmental VAX/VMS systems or departmental RSX-11/M systems or the KL DECsystem10 to a VM/CMS user.

As yet there is no provision for virtual terminal access to the IBM system from the network, but the Centre is investigating providing this facility.

The file transfers between the two different systems are performed by the co-operation of the RSCS program which runs on an IBM CPU and a package called jnet (trademark of Joiner Associates) which emulates RSCS under the VAX/VMS operating system.

The Centre has now implemented jnet, and has provided two new commands to facilitate the transfer of most printable files without concern about record length, file formats, translation etc. It is possible to use jnet to transfer other types of files. Users with special needs should contact the author.

File Transfers to VM/CMS

The VAX/VMS User

Files may be transferred over the network to the VM/CMS system by giving the VAX/VMS command IBMSND. This procedure will convert the ASCII characters in the input file to the EBCDIC characters used by VM/CMS. Character set conversion is discussed in a later section.

The IBMSND command prompts the user for all required information and an

example of its use follows.

Note that the user may give a network file specification for the input file thus transferring a file from another system (such as the DECsystem10 node UQKL10 or a departmental PDP-11 running RSX-11/M) to VM/CMS.

In the following examples user type-in is in bold, and <CR> indicates the typing of the "RETURN" or "ENTER" key.

\$ IBMSND

For all questions the default answer is displayed in brackets,

e.g. [Y] indicates the default answer is YES

File to transfer to IBM host UQVM? : **LOGIN.COM**

;Type name of file to transfer, could be a file from another node.

;An answer of <CR> will exit the procedure.

File name and type for CMS [LOGIN.COM]? : <**CR**>

;The user may specify the CMS file name and type to be given to the

;file when it gets to the user's virtual reader. The file name

;and type must be separated by a ".". The default is the same

;file name and type as the file being transferred.

Previous logical name assignment replaced

Previous logical name assignment replaced

;These are just two information messages and may be ignored. They

;will not always be typed.

CMS user to receive file [BUNNY]? : <**CR**>

;Specify the user who will receive the file. The default is the user

;of the same name as the current VAX/VMS user.

;The file is then converted and sent to RSCS. If the user is still

;logged in when the transmission is completed, a message such as

;

;(UQVAX) – Sent file 7408 on link UQVM to UQVM BUNNY

;

;will be typed on the user's terminal.

;Then the command returns to the prompt for a file to send. At this

;point typing a <CR> will return to DCL command mode.

The VM/CMS user

Files sent from the VAX will be placed by RSCS into the user's virtual reader queue. The CMS COMMAND RDRLIST (an EXEC procedure) may be used to examine the user's reader queue. The RDRLIST command causes the display for each file of the user and node of the sending user and gives the option (PF11) of "peeking" at the file with XEDIT. The reader file may be DISCARDED, or saved via the RECEIVE command. RECEIVE has many parameters and these can be explored more fully within VM/CMS Help.

Give the CMS commands HELP RDRLIST and HELP RECEIVE for further information on the RDRLIST and RECEIVE commands and options.

File transfers from VM/CMS

The VM/CMS user

The easiest way to send files from CMS is to give the SENDFILE command (which invokes the SENDFILE EXEC procedure) with no arguments. The EXEC then displays a screen menu which may be filled in by the user and when the menu

is complete, the file may be sent by typing PF5 or ENTER. When filling in the screen menu, a <TAB> moves on to the next field unless the current field is full in which case the next character automatically is placed in the next field. The user to receive the file is specified as "user AT node", for example BUNNY AT UQVAX specifies that user BUNNY at node UQVAX is to receive the file.

When RSCS places the file into its queue a message of the form

FILE 4928 (4928) ENQUEUED ON LINK UQVAX

will be displayed on the terminal and when RSCS has completed transmission of the file a message of the form:

SENT FILE 4928 (4928) ON LINK UQVAX TO UQVAX BUNNY

will be displayed on the terminal.

Further information about the SENDFILE command can be obtained by typing the CMS command HELP SENDFILE.

The SENDFILE EXEC references a file of "nick names" or abbreviated names. A nick name may be just another name for a particular user or another name for a user at a particular node. For example the nick name MEVAX might be the nick name specifying my user name on node UQVAX. Then I might specify MEVAX as the destination for the SENDFILE command to send a file to me on node UQVAX. Further information on this facility may be obtained by typing the CMS command HELP NAMES.

The VAX/VMS user

When jnet receives a file for a VAX/VMS user it writes the files to a system directory called JAN__FILES: with the owner being the UIC of the user to which the file was sent. Therefore, even though the file does not appear in the user's directory it is charged against the user's disk quota! (Note that the user may not have any quota at all on the disk used for this temporary file storage, and therefore it could be an expensive business to leave a file on JAN__FILES.) jnet also sends the user a mail message to inform him that the file has arrived. The mail message is quite wordy and currently occupies more than one screen full of text.

The user should type the VAX/VMS command:

IBMRCV

which will then scan all files on JAN__FILES: for files with the owner UIC of the user who invoked it and will then give the user the option of copying each file with no character translation (in most cases not very useful) or translating it. After successful copy or translation the file is deleted from JAN__FILES:.

An example of the use of IBMRCV follows:

\$ IBMRCV

;For this question typing <CR> or "Y" or "y" will do a character
;conversion on the file, anything else will do a copy.

Translate jan__files:DMSDDL.ASS;1 from CMS EBCDIC to VAX/VMS AS-
CII [Y]? :<CR>

;The next prompt allows the user to change the name of the output file,
;the default used if the user types a <CR> is shown in brackets.
;The file may also be sent to another node by DECNET.

Output file [DMSDDL.ASS]? :<CR>

;The next message displays the full CMS file identification of the

;transferred file, in this case DMSDDL ASSEMBLE A1, and the file
;specification of the output file.

%jnet-I, Converting CMS EBCDIC file

“DMSDDL ASSEMBLE A1” to VAX/VMS file
“DSKB:[BUNNY]DMSDDL.ASS;1” with fixed length records of 80
characters

;The procedure will repeat until all files on JAN__FILES: with
;the owner UIC of the user are processed.

Sending mail

The VAX/VMS user

Mail sent to a UQVAX user from a VM/CMS user is automatically put into a VAX/VMS mail box. The VAX/VMS user may reply to this mail and the reply will return to the VM/CMS user who sent the original message.

To send mail to a VM/CMS user the VAX/VMS user specifies in the MAIL “To:” prompt a network address of the form:

GATEWAY::“user@host”

thus a MAIL destination address of GATEWAY::“SANTA@UQVM” will send mail to user SANTA on the IBM system (and you were brought up to believe you had to send mail to SANTA at the north pole!).

The VM/CMS user

The VM/CMS user can send mail to a VAX/VMS user by means of the CMS NOTE command (an EXEC procedure), for example:

NOTE SANTA AT UQVAX

which will send a NOTE (CMS terminology for a mail message) to user SANTA at node UQVAX.

Further information on the CMS NOTE command can be obtained by typing the command HELP NOTE to CMS. The command HELP NAMES may also be typed to obtain information on a facility for creating address lists and addressing users by abbreviated names (nick names).

Discussion of character set conversion problems

The IBM uses the EBCDIC character code whereas the DEC computers (and the IBM PC) use ASCII (or International Alphabet 5). All alphabetic and numeric characters exist in both character sets as well as the punctuation characters and common graphic characters, but there are some characters in the ASCII set which are not in the EBCDIC character set as well as some in the EBCDIC character set which do not occur in the ASCII set.

The Prentice Computer Centre has determined a common translation mapping which is now implemented in the following places:

“CHANGE” on 10s

“IBMSND” on VAX

“IBMRCV” on VAX

“YALE” terminal controller on Series/1s

The intention is that a file transferred from other machines to UQVM will contain equivalent characters and will as far as possible print and display the same as on the originating machine. We are ordering additional characters for the IBM print train to enable all displayable ASCII characters to be printed on the IBM printer.

Comparison of system with current DECNET facilities

File transfers involving the IBM system are performed by a special operating system (RSCS for Remote Spooling Communications Subsystem) which runs in its own virtual machine under the control of CP (the master Control Program). As the name implies RSCS is a spooling system, so when a VM/CMS user gives a file transfer command, the file is "copied" to the RSCS machine and added to a queue.

RSCS can transfer at most one file into itself and one file out at any one time over each communications line. This is rather different from DECNET transfers which normally happen while the user waits. DECNET also allows any file transfers to happen simultaneously.

RSCS informs the VM/CMS user when a file transfer is queued and when it has completed.

RSCS has no "file server" component so unlike DECNET, the IBM file transfer system restricts users to SENDING files from one RSCS system to another. A user cannot give a command to transfer a file from another system to the system on which the user is logged in.

The software package called "jnet" (a trademark of Joiner Associates) effectively implements RSCS on a VAX/VMS system. Thus jnet appears to RSCS to be another RSCS system, and so it is possible to transfer files from UQVAX to VM/CMS (if you are logged in on UQVAX) and from VM/CMS to UQVAX (if you are logged in under VM/CMS). As described earlier, it is not possible for a user logged in on UQVAX to cause a file to be transferred from VM/CMS (the user must login under VM/CMS to do this) nor is it possible for a user logged in under VM/CMS to cause a file to be transferred from UQVAX (the user must login on UQVAX to do this).

The jnet package also includes the ability to send MAIL from UQVAX to VM/CMS users, and to accept mail for UQVAX users from VM/CMS.

At present jnet runs only on the central VAX-11/780 node UQVAX. Joiner associates have indicated that a future version of jnet may communicate with other copies of jnet using DECNET, and this would allow departmental VAX/VMS systems to run jnet and thereby receive files and mail from VM/CMS users. At present the only network host which can run VM/CMS is the central IBM 3083 node UQVM. This may change in the future.

*Arthur Hartwig
extension 4079*

6. A Stitch in Time ...

A recent case, concerning the transfer of a user's files to another institution, highlights the need for users taking up new positions to discuss their plans with the Centre **before** leaving. Failure to do so is likely to involve them in a multi-party exchange over such trifles as the file format, labelling and medium to be employed, and those not so insignificant matters, file ownership and who is to meet the costs of transfer?

So please, before leaving either University, whether permanently or for a known period, check with the Centre for advice on the best procedure for transferring files and programs.

*Tony Bird
extension 3944*

7. MAIL System Modifications

Several changes have been made to the MAIL system on the KL DECsystem-10. Type DOC:MAIL.MEM for a full description, but the main ones are described here.

(1) SUMMARY command

This feature of MAIL gives a quick list of outstanding MAIL messages, e.g.:

```
.R MAIL
Mail command: SUMMARY
From FRED[200,200]                Postmark:12-Apr-84:08:55:56
To JOE[300,300]
Subject: X

From BILL[400,400]                Postmark:12-Apr-84:09:00:06
To JOE[300,300]
Subject: Y
```

or

```
.MAIL SUMMARY
```

(2) Modification to 'To' specification in message header

If you send a message to multiple mail addresses, then the "To" line in each receiver's message will only contain the receiver's name.

(3) Informing sender of receiver names after To: specification

MAIL will now specify all the mail addresses that will receive the message. This will help prevent the MAIL user from inadvertently sending mail to the incorrect mail addresses. Use .QUIT if you don't want to send to the people listed, e.g.:

```
.R MAIL
Mail command: SEND
To: CLUB
To CCLUB[223,100], CEXEC[223,101]
Subject: .....
```

CHANGE and DELETE commands, which change your name or remove it, have been enhanced slightly, also.

Ian Burgess
extension 4074

8. Maximum Typesetting Width Reduced

JUSTIF, the document preparation program for typesetting from the KL, was recently modified to improve accuracy. This has, however, lead to the uncovering of a hardware limitation in the CG8400 (our in-house typesetter). It turns out that the CG8400 really can't handle 70 pica widths as stated in the documentation. In reality it can't handle over 69 picas reliably, so guess what the new maximum column width is? That's right folks: you can't go past 69 picas now. If you try (as some will) JUSTIF will complain with a message like: "LINE LENGTH TOO LONG FOR COMPOSITOR".

Porl Gordon
extension 2953

9. Typesetting on the VAX

It is now possible to typeset directly from the VAX, i.e. you no longer need to copy files to the KL to put on the typesetter queue for typesetting. You can now typeset them with the VAX command

```
PRINT/QUEUE=SYS$TYPSET: filename
```

or

```
PRINT/QUEUE= LNB1: filename.
```

The times for clearing the queue will be the same as for the KL queue. Other than at the queue clearing times the typesetter must be available for urgent jobs and only one machine (the KL has been decided) can have access to it at a time. Hence there is no urgent queue on the VAX. Urgent jobs can still be typeset immediately by copying the file to the KL and then submitting it as a regular urgent job. Copy to the KL can be done easily by:-

```
$ COPY file1.ext KL::file2.ext
```

where KL is defined in login.com by the line:-

```
$ DEFINE KL "UQKL10"[NNN,NNN] passwd""::"
```

where NNN,NNN is the KL project programmer number or ppn and passwd is the network file transfer password set up on the KL with the NETMAN program as follows:-

```
.R NETMAN [NMN]> insert
```

At this stage you are prompted for a password twice.

```
[NMN]> exit
```

The more general form of the copy command is:-

```
$ COPY file1.ext UQKL10"[NNN,NNN] passwd":file2.ext
```

Software to produce files for typesetting has been available on the the VAX now for some time. This TROFF software is available under Eunice which is a UNIX emulator available on the VAX. Some advantages that TROFF offers are macro processors that cater for common needs, the facility to create macros for specialised needs, a preprocessor for table handling called TBL, a preprocessor for typesetting mathematics, and a sister program NROFF which will produce normal fixed width character output for ordinary terminals.

Queries on Eunice may be directed to Ian Otto (ext 4075) or myself. Queries/problems with the spooler and the TROFF software should be directed to me.

*Greg Lehmann
extension 3020*

10. The Nine Lives of TCS

We've recently received a new distribution of that old diehard, TCS. TCS (for **T**ermin**a**l **C**ontrol **S**ystem) is a set of subroutines designed to drive Tektronix terminals.

The majority of people won't be troubled by the new release. Any changes to the subroutines are mainly of a "tidying up" nature. Your programs should not need any alterations.

New Subroutines

About six new subroutines have been added. These are all to do with using the colour and panel features of the Tektronix 4100 series terminals. The documentation provided with these routines is very poor, but I'm quite willing to share with you all I know of them. There are subroutines to set line colour, define a "panel" by means of vertices, play with fill patterns, and fiddle individual pixels on the screen.

UQKL10 Users

On the UQKL10, the new TCS library was compiled using the FORTRAN-77 compiler. And before the thought of that drives you into a state of traumatic shock, let me reassure you that this causes very few ripples in life's turbulent stream. After all, FORTRAN-77 is due to become the default compiler! The only extra command you need to give (before compiling your program) is to type

`.PATH /NEW`

Then you can give the same COMPILE, EXECUTE, or whatever commands as you always have. A typical command to load your program with TCS would be:

`.LOAD program, SYS:TCS/LIB`

If you get an error message saying "?Illegal REL block type 1130" this means you've forgotten to give the "PATH/NEW" command.

(By the way, for those of you who dislike all these new-fangled things, the old TCS library is still available as OLD:TCS.REL).

And UQVAX Users

There's no difference in any procedure for you. Use the same commands as you have been, i.e.

`$ LINK program, SYS$LIBRARY:TCS/LIB`

Lastly, PDP-11 Users

Yes, we should be able to supply you with a copy of these new routines. Phone us, and we'll see what we can do.

Other Added Goodies

The new TCS library contains the basis TCS routines, plus the Software Character Set, and the Advanced Graphing routines. The Computer Centre has documentation on these – feel free to come and browse through the books.

Mark Williams
extension 2921

11. Availability of HP-7585 Plotter for VAX Users

The PLT3 plotter is now available to users of UQVAX. This is a HP-7585 plotter, with 8 pens, and draws on sheets up to A0 size. It's located at the Hawken Batch Station. To put a plot file onto the queue for this device, the command is simply:

`$PLOT filespec`

(This is assuming that the plot was generated for the PLT3 plotter. See Newsletter N-289, June 1984, for details on doing this, using the PLOTIN subroutine).

We'll publish notices about availability of this plotter from the UQKL10, and of PLT4 and PLT5, in future issues of the newsletter.

Mark Williams
extension 2921

12. KERMIT Developments

A new strategy has been designed for the dissemination of the different flavours of KERMIT (KL10 Error-free Reciprocal Micro Interface Transfer — a file transfer package For micro/mini/mainframe computers) obtained by the Prentice Computer Centre from Columbia University Centre for Computing Activities. An on-line disk area has been allocated on the UQKL10 system so that users can readily help themselves to the latest versions of KERMIT for their particular computers. This area is DSKX:[5,124]. To access it, type commands (in bold):

```
.PATH KER: = DSKX:[5,124]/ADD:DSKX:<cr>
Job search list:      DSKD:, DSKX:, FENCE
Logical name definitions:
KER: = DSKX:[5,124]
.DIR KER:*.DOC<cr>
86KERM  DOC      35  <457>      5-Jul-84      DSKX:  [5,124]
(etc.)
```

The first command sets up a logical name KER: pointing to the DSKX:[5,124] User File Directory, and adds DSKX: to the user's Job Search List. (Type

.HELP PATH<cr>

for more information on the PATH command.) The second command shows how the KERMIT library can be accessed by using the logical name KER: instead of having to remember to type DSKX:[5,124] for each command.

The intention is that users should transfer what they need from the KERMIT library. If a user is unable to do this and would like us to do this on his/her behalf, or requires the software on some other media, e.g. magnetic tape, we would be happy to arrange a Media Conversion Small Job to do this.

There are several specific files on the KERMIT library area to be aware of:

FLYER.DOC	explains the distribution policy as laid down by Columbia University.
USER.DOC	is the generalized document on installing and running KERMIT.
PROTO.DOC	is a description of the protocol for those who want to develop KERMIT to something new.
00READ.TXT	contains explanations of the library as distributed from Columbia University.
CURREN.DOC	contains the details of current developments at the time of shipment of the software from Columbia University. Local developments will NOT be listed here.
KERMIT.NEW	contains the up-to-date news on local developments.
KERMIT.DIR	contains a list of the original file names from the VAX/VMS distribution tape. These file names were up to 9 characters long in true VMS and TOPS-20 style, but are unique to 6 characters. File names get truncated to 6 characters when transferred to TOPS-10.
other.DOC	contain documentation for each specific flavour of KERMIT.

*.MSG	contain words of wisdom from the developer of the particular flavour of KERMIT.
*.BWR	these are BEWARE files – they list items of CAUTION for the particular implementation of KERMIT.
*.HEX	these are HEXified versions of the executable files – may be useful to get you going – see installation notes to find out how to make use of these.
sources	says it all.

Files for a particular type of machine have a particular prefix as part of all related files, e.g. CPM*.* for all flavours of CP/M systems. There may be further sub-groupings, e.g. CPMOSB.* are files for the OSBORNE I CP/M system, CPMAPP.* are files for the APPLE II CP/M system. A list of the prefixes can be found in file CURREN.DOC.

It should be remembered that this is public domain software. The Prentice Computer Centre does not guarantee this software to be error-free, and accepts no responsibility for any disasters arising from its use (not that we expect any). It has been obtained and is being supplied to our users in good faith and hopefully good working order (although we know of a couple of implementations that did not work first try – we are working on them). What we have got hardware for, we will endeavour to maintain. We would like anyone who creates a new flavour of KERMIT to forward it to us so that we can add it to the library (with appropriate credits, of course), and eventually pass it back to Columbia University.

PLEASE REMEMBER

KERMIT is public domain software, BUT we are obliged to remind you that the protocols are Copyrighted to Columbia University Centre for Computing Activities, and they have directed that KERMIT should be used for non-commercial and peaceful activities only!

Please direct further enquiries to the electronic mail address MICROS.

*Peter Akers
extension 2921*

13. Information Concerning Courses

Below is the schedule of courses for the period August-October. (Where necessary, additional courses may be added to the list.)

Note: regarding the courses "Introduction to IBM" (4 half days) and "Conversion to IBM" (3 half days):

The "Conversion" course is directed at users with familiarity of some computer system (e.g. PDP-10) and who now wish to make use of the IBM system; the "Introduction" course is intended for new users with no previous computing experience, i.e. it corresponds in function to the "Introduction to PDP-10" course.

One of the two above courses should normally have been completed before attending either the SQL course or the SCRIPT course (just as the "Introduction to PDP-10" course is required before attending courses on PDP-10 packages).

August

Introduction to PDP-10	August 13,14,16,17 4 half days 9-12 each day
------------------------	---

Introduction to IBM	August 13,14,16,17 4 half days 1-4 each day
Conversion to IBM	August 21-23 3 half days 1-4 each day
Introduction to IBM	August 27-30 4 half days 9-12 each day
Introduction to PDP-10	August 27-30 4 half days 1-4 each day
September	
Conversion to IBM	September 3-5 3 half days 9-12 each day
CAD/CAM	September 3-6 4 full days 9-12 + 1-4
1022	September 10-14 5 half days 9-12 each day
Typesetting	September 10-13 4 half days 1-4 each day
Introduction to IBM	September 17-20 4 half days 9-12 each day
SPSS	September 17-21 5 half days 1-4.30 each day
Conversion to IBM	September 24-26 3 half days 1-4 each day
TECO Editing	September 27 1 full day 9-12 + 1-4
October	
Introduction to PDP-10	October 1-4 4 half days 9-12 each day
SQL	October 8-11 4 half days 9-12 each day
Introduction to IBM	October 8-11 4 half days 1-4 each day
RUNOFF	October 15-18 4 half days 1-4 each day
Conversion to IBM	October 16-18 3 half days 9-12 each day
SCRIPT	October 22-25 4 half days 9-12 each day
Introduction to PDP-10	October 22-25 4 half days 1-4 each day

Notes:

1. All of the above courses will be held in Room G13A – Hawken Building.
2. Enrolments for all courses may be made by phoning extension 3018.

Barry Maher
extension 3021

